2.1.4 How can I rewrite it in graphing form?

Rewriting in Graphing Form

In Lesson 2.1.3, you used the method of averaging the intercepts to change the equation of a parabola from the standard form $f(x) = ax^2 + bx + c$ to the graphing form $f(x) = a(x - h)^2 + k$ by finding the x-intercepts and averaging them to find the x-value of the vertex. Next you substituted to find the y-value, and then used the coordinates of the vertex for h and k.

What can you say about a parabola that cannot be factored or that does not cross the x- axis? How can you write its equation in graphing form? In a previous course you may have learned how to complete the square for quadratics and this strategy can help you write the graphing form for a parabola.

2-42. In this investigation you will compare two methods of changing a quadratic equation from standard form to graphing form.

a. Write the equation of the parabola $y = x^2 - 2x - 15$ in graphing form using two methods. First, use the method of averaging the intercepts. Then, use the method of completing the square. Find the x- intercept(s), the y- intercept(s), and the vertex of the parabola, and sketch the graph.
b. Write $y = x^2 + 8x + 10$ in graphing form. Find the intercepts and vertex, and sketch the graph. Do both strategies work for this parabola?
c. Can you use both methods to sketch $y = x^2 + 2x + 4$. Do both strategies still work?
d. Discuss the two strategies with your team. Then respond to the following Discussion Points.

Discussion Points

When does the method of averaging the intercepts work better?
When does the method of completing the square work better?
Which method was more efficient and why?

3.2.4 How can I rewrite it?

Adding and Subtracting Rational Expressions

So far in this course you have learned a lot about rational expressions. You have learned how to simplify complex algebraic fractions by factoring the numerators and denominators. You have also learned how to multiply and divide rational expressions. What else is there? Today you will develop a method to add and subtract algebraic fractions.

3-97. With your team, read your directions for Monica's sister from homework problem 3-92. Verify that everyone obtained the same answer and be prepared to share how you added the fractions with the class.

$$\frac{1}{3}+\frac{2}{5}$$

a. Now Monica's sister wants to know *why*? Why does she have to do all of those steps with the common denominator? What is a fraction anyway, and why does adding them have to be so complicated? Draw some pictures or diagrams or make up some situations that will help her to know what fractions like $\frac{1}{3}$ and $\frac{2}{5}$ mean.

b. Now use your ideas from part (a) to show Monica *why* she needs a common denominator to add the two fractions.

3-98. Extend the procedures your class developed for numerical fractions to add these algebraic fractions.

$$\frac{2x}{x-1}+\frac{3}{x+5}$$

5.2.1 How can I undo an exponential function?

Finding the Inverse of an Exponential Function

5-57. AN ANCIENT PUZZLE

Parts (a) through (f) below are similar to a puzzle that is more than 2100 years old. Mathematicians first created the puzzle in ancient India in the 2nd century BC. More recently, about 700 years ago, Muslim mathematicians created the first tables allowing them to find answers to this type of puzzle quickly. Tables similar to them appeared in school math books until recently.

Here are some clues to help you figure out how the puzzle works:

$\log_2 8 = 3$ $\log_3 27 = 3$

$\log_5 25 = 2$ $\log_{10} 10{,}000 = 4$

Use the clues to find the missing pieces of the puzzles below:

a. $\log_2 16 = ?$
b. $\log_2 32 = ?$
c. $\log_? 100 = 2$
d. $\log_5 ? = 3$
e. $\log_? 81 = 4$
f. $\log_{100} 10 = ?$